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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of	)	
Hillegonda Bakker et al.	)	
Serial No. 10/500,280	)	Group Art Unit: 3744
Filed June 28, 2004	)	Examiner: John F. Pettitt
MULTISTAGE FLUID SEPARATION ASSEMBLY AND METHOD	)	January 28, 2009

COMMISSIONER FOR PATENTS
Alexandria, VA 22313

Sir:

PRE-APPEAL BRIEF REQUEST FOR REVIEW

Applicant requests review of the final rejection dated October 29, 2008, in the above-identified application. No amendments are being filed with this request. The request is being filed with a Notice of Appeal.

Claims are listed beginning on page 2 of this paper. This request does not include any amendment to the claims.

Remarks/Arguments begin on page 8 of this paper.

CLAIMS

Applicants have provided a listing of the claims. This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims

1. (Previously Presented) A multistage fluid separation assembly comprising:

a plurality of primary gas cooling devices each of which has a liquefied and/or solidified condensables enriched fluid outlet; and,

a secondary fluid separation vessel having a tubular section of which a central axis has a substantially vertical or tilted orientation, which vessel is connected to said condensables enriched fluid outlets of said primary gas cooling devices, wherein during normal operation of the vessel the condensables enriched fluid is induced to swirl around the central axis of the tubular section of the vessel such that a tertiary stream-of liquefied and/or solidified condensables is induced by gravity and centrifugal forces to swirl in a downward direction alongside an inner surface of the tubular section of the vessel into a liquid collecting tank at or near a bottom of the vessel for collecting a tertiary mixture of liquefied and/or solidified condensables, which tank is provided with one or more heaters for heating the tertiary mixture to reduce the amount of solidified condensables and with one or more outlets for discharging the tertiary mixture from the tank;

wherein the plurality of liquefied and/or solidified condensables enriched fluid outlets are connected at regular circumferential intervals to the tubular section of the secondary separation vessel and the enriched fluid outlets inject in use condensables enriched fluid in an at least partially tangential direction into the interior of the secondary separation vessel.

2. (Previously Presented) The fluid separation assembly of claim 1, wherein the liquid collecting tank comprises an upper liquid outlet for low density liquid components and a lower liquid outlet for high density liquid components.

3. (Previously Presented) The fluid separation assembly of claim 1, wherein the tubular section of the secondary separation vessel is equipped with a tertiary gas outlet conduit having an inlet which is located at or near the central axis of the tubular section.

4. (Previously Presented) The fluid separation assembly of claim 3, wherein the secondary separation vessel has a dome or disk shaped top which is mounted on top of the tubular section and the tertiary gas outlet conduit is arranged substantially co-axial to the central axis of the tubular section and passes through said top.

5. (Previously Presented) The fluid separation assembly of claim 1, wherein the liquefied and/or solidified condensables enriched fluid outlet of at least one primary gas cooling devices injects in use the condensables enriched fluid in an at least partially tangential direction into the tubular section of the secondary separation vessel.

6. (Previously Presented) The fluid separation assembly of claim 5, wherein the central axis of the tubular section of the secondary separation vessel has a substantially vertical orientation and said plurality of primary gas cooling devices each of which has a liquefied and/or solidified condensables enriched fluid outlet inject in use condensables enriched fluid in an at least partially tangential and partially downward direction into the interior of the secondary separation vessel.

7. (Previously Presented) The fluid separation assembly of claim 1, wherein the liquid collecting tank is formed by a cup-shaped tubular lower portion of the secondary separation vessel which is substantially co-axial to the central axis and has a larger internal width than the upper portion of the vessel.

8. (Previously Presented) The fluid separation assembly of claim 1, wherein a vortex breaker is arranged in the interior of the secondary separation vessel between the lower end of the tubular section and the liquid collecting tank.

9. (Previously Presented) The fluid separation assembly of claim 1, wherein the assembly is provided with one or more ultrasonic vibration transducers for imposing ultrasonic vibrations on one or more components of the assembly to inhibit deposition of solidified condensables, such as ice, wax and/or hydrates, within the assembly.

10. (Previously Presented) The fluid separation assembly of claim 8, wherein at least one of the plurality of primary gas cooling devices, each of which has a liquefied and/or solidified condensables enriched fluid outlet and the vortex breaker, are equipped with ultrasonic vibration transducers.

11. (Previously Presented) The fluid separation assembly of claim 9, wherein the ultrasonic vibration transducers are designed to vibrate in use one or more components of the assembly at a frequency between 20 and 200 KHz.

12. (Previously Presented) The fluid separation assembly of claim 1, wherein the liquid collecting tank is provided with a grid of heating tubes which are designed to heat the liquid and solid fluid mixture in the tank to a temperature of at least 15 degrees Celsius.

13. (Currently Amended) The fluid separation assembly of claim 1, wherein at least one of the plurality of primary gas cooling devices, each of which has a liquefied and/or solidified condensables enriched outlet, comprises a primary cyclonic inertia separator comprising an expansion nozzle in which the fluid mixture is cooled to a temperature lower than 0 degrees Celsius by a substantially isentropic expansion and in which one or more swirl imparting vanes induce the fluid to swirl into a diverging outlet section which is equipped with a central primary condensables depleted fluid outlet conduit and an outer secondary condensables enriched fluid outlet conduit.

14. (Previously Presented) The fluid separation assembly of claim 13, wherein each primary cyclonic inertia separator comprises an expansion nozzle designed to accelerate the fluid mixture within the nozzle to a supersonic speed, thereby cooling the temperature of the fluid passing through the nozzle to a temperature lower than -20 degrees Celsius.

15. (Previously Presented) The fluid separation assembly of claim 13 comprising a plurality of primary cyclonic inertia separators of which the expansion nozzles are substantially parallel and equidistant to the central axis of the tubular section of the secondary separation vessel and of which the secondary condensables enriched fluid outlets are connected to secondary fluid injection conduits which intersect the wall of the tubular section of the secondary separation vessel at regular circumferential intervals and in an at least partially tangential direction, and which secondary fluid injection conduits each have a length less than 4 meters.

16. (Previously Presented) The fluid separation assembly of claim 1, wherein the gas cooling devices comprise chokes.

17. (Previously Presented) A method of separating condensable components from a fluid mixture in a multistage fluid separation assembly, the method comprising:

injecting the fluid mixture into a plurality of primary gas cooling devices in which the fluid mixture is expanded and cooled and condensable components are liquefied and/or solidified and in each primary gas cooling device a stream of condensables enriched fluid components is fed into a secondary fluid outlet; and

injecting the stream of condensables enriched fluid components into a secondary fluid separation vessel having a tubular section of which a central axis has a substantially vertical or tilted orientation and in which the condensables enriched fluid stream is induced to swirl around the central axis of the tubular section of the vessel such that a tertiary mixture of liquefied and/or solidified condensables is induced by gravity and centrifugal forces to swirl in a downward direction alongside an inner surface of the tubular section of the vessel into a liquid collecting tank at or near a bottom of the vessel, in which tank the tertiary mixture of liquefied and/or solidified condensables is collected and heated to reduce the amount of solidified condensables and from which tank liquid and/or solidified components are discharged through one or more outlets;

wherein a plurality of secondary fluid injection outlets are connected at regular circumferential intervals to the tubular section of the secondary separation vessel, and the enriched fluid outlets inject the condensables enriched fluid in an at least partially tangential direction into an interior of the secondary separation vessel.

18. (Previously Presented) The method of claim 17, wherein the fluid mixture is a natural gas stream which is cooled in the gas cooling devices comprising one or more primary cyclonic inertia separators to a temperature below 0 degrees Celsius thereby condensing and/or solidifying aqueous and

hydrocarbon condensates and gas hydrates and the tertiary fluid mixture comprises water, ice, hydrocarbon condensates and gas hydrates and is heated in the tertiary fluid collecting tank to a temperature above 15 degrees Celsius to reduce the amount of gas hydrates, and from which tank low density hydrocarbon condensates are discharged through an upper liquid outlet and high density aqueous components are discharged through a lower liquid outlet.

19. (Previously Presented) The method of claim 17, wherein liquefied and/or solidified components are separated from the gaseous components by centrifugal force in the primary gas cooling device.

REMARKS/ARGUMENTS

Claim Rejections under 35 U.S.C. §103

In the Office Action, Examiner rejects claims 1-7, 12, and 16-19 under 35 U.S.C. §103(a) as being unpatentable over US Patent 2,683,972 to Atkinson (hereafter Atkinson) in view of US Patent 3,259,145 to Engle (hereafter Engle). Examiner has failed to provide a prima facie basis for rejection under 35 U.S.C. § 103(a) because there is no teaching or suggestion in these references of the "liquefied and/or solidified condensables enriched fluid outlet" of the independent claims of the present application. Applicant has made this argument in the response mailed on January 8, 2008 and again in a respose filed on July 24, 2008. In the office action mailed October 29, 2008, the Examiner indicates that he does not agree that this element is missing from the references. The Examiner, in paragraph 4 of the office action mailed February 29, 2008, indicates that the vortex tube 13 of Atkinson is the same as the primary gas cooling device of the present invention, and that the cooled gas outlet 14, is the same as the condensables enriched fluid outlet of the present invention. Applicant respectfully disagrees.

In Applicants response mailed on July 24, 2008, Applicant provided references to show what is meant in the art by the term "vortex tube" and how a "vortex tube" functions. The purpose for this argument is to demonstrate that a vortex tube does not concentrate or enrich condensables in a stream. The Examiner, in paragraph 7, takes the position that outlet 14 is a "condensables enriched fluid outlet". The cold outlet 14 of Atkinson is not enriched in condensables. This is clear from the explanation of how a vortex tube functions provided in the response mailed on July 24, 2008 and repeated below. The Examiner points to lines 1-10 of col. 3 for support for his statement that outlet 14 is a condensables enriched fluid outlet, but there is no support for this position. What Atkinson says is that this stream contains condensed water. Atkinson does

not say that the condensables are enriched in this stream. A vortex tube does not have a structure that concentrates the condensables. A vortex tube will split a flow and create a hot stream and a cold stream, but the compositions of the streams are the same.

To clarify and reiterate why a vortex tube does not concentrate condensables, Applicant points to US patent 1,952,281, herein after Ranque, to explain how the vortex tube of Atkinson operates. Ranque is cited by Atkinson at column 2, lines 34-37, to describe what the vortex tube of his invention is. The vortex tube of Ranque has a cold outlet, and a hot outlet. Orifice A is the exit for a stream of cold fluid, and orifice B is the exit for a current of hot fluid. The vortex tube operation is described as having the flow from an inlet pipe 7, which is referred to as flow sheet 11, spin around the outside of the tube until the flow, which is at this time, the total flow, reached a deflector 9, at which point, some fluids are allowed to exit the tube through orifice B as the remaining fluid, which is flow sheet 12, is forced to return through the center of the tube to exit the tube at orifice A in the opposite direction. The angular velocity of flow sheet 12 is not lost, and so the returning portion of the stream continues to circulate as it travels in the opposite direction. It is claimed by Ranque that the returning stream, flow sheet 12, exerts work on the total stream, flow sheet 11, and because of conservation of energy, the temperature of flow sheet 11 is increased at the expense of flow sheet 11, which cools. Flow sheet 12 consists of a portion of flow sheet 12, and there is no indication that the compositions of the streams are any different.

The workings of a vortex tube found under “Vortex Tube” in Wikipedia is consistent with the description provided by Ranque.

Thus, Applicant remains of the position that the element of the “liquefied and/or solidified condensables enriched fluid outlet” of the independent claims of the present application is not taught or suggested by neither Atkinson nor Engle.

A prima facie basis for the rejection under 35 U.S.C. §103(a) is therefore not presented, and this rejection is respectfully traversed.

Dependent claims 2-7, 12 and 16-19 depend from either claim 1 or claim 17 and include all the limitations of the independent claims. Thus, Applicants respectfully request that the rejection of claims 1-7, 12, and 16-19 under 35 U.S.C. §103(a) be withdrawn and the claims formally allowed at this time.

Conclusion

Applicants have addressed each and every objection and ground for rejection. The amended claims are patentable over the cited art and Applicants request that the application be allowed.

Respectfully submitted,
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